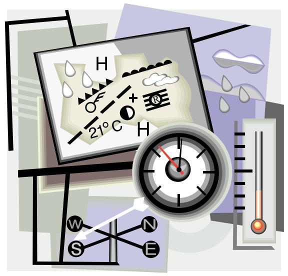
Kansas Weather



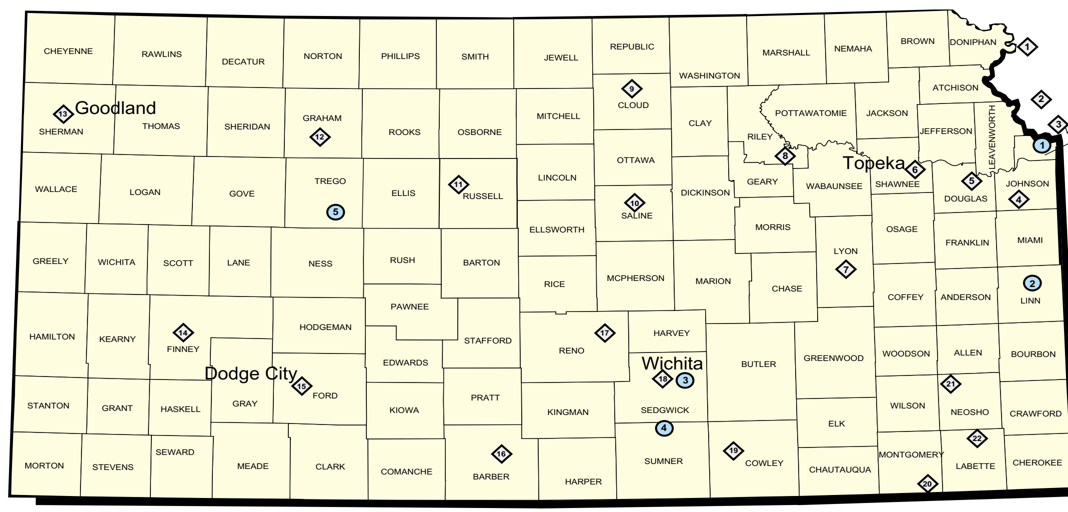
No discussion on the quality of Kansas air can be complete without talking about the effects the weather of Kansas has on our environment.

Because of the state's geographical location in the middle of the country, Kansans experience four distinct seasons. Cold winters and hot, dry summers are the norms for the state. The other constant in Kansas weather is the wind. Kansas ranks high in the nation in average daily wind speed. In 2000, the average wind speed across the state was a little over 11 miles per hour (m.p.h.). The predominant wind direction was from the south. These factors combine to affect the two major areas of air quality concern in the state, ozone and particulate matter.

The air pollution meteorology problem is a two-way street. The presence of pollution in the atmosphere may affect the weather and climate. At the same time, the meteorological conditions greatly affect the concentration of pollutants at a particular location, as well as the rate of dispersion of pollutants.

The ground level ozone or smog problem develops in Kansas during the period from April through October. Ozone is formed readily in the atmosphere by the reaction of volatile organic compounds (VOC) and oxides of nitrogen (NO_x) in the presence of heat and sunlight, which are most abundant in the summer months. Kansas tends to see ozone episodes in the summer when high pressure systems stagnate over the area which leads to cloudless skies, high temperatures and light winds. Another element of these high pressure systems that contribute to pollution problems is the development of upper air inversions. This will typically "cap" the atmosphere near the surface and not allow the air to mix and disperse pollutants. Therefore,

Figure 1 - Kansas Area Weather Stations



NOAA Sites -

1. St. Joseph, MO. - STJ
2. KC International, MO. - MCI
3. KC Downtown Airport, MO. - MKC
4. Olathe - OJC
5. Lawrence - LWC
6. Topeka - TOP,FOE
7. Emporia - EMP
8. Manhattan - MHK
9. Concordia - CNK
10. Salina - SLN
11. Russell - RSL
12. Hill City - HLC
13. Goodland - GLD
14. Garden City - GCK
15. Dodge City - DDC
16. Medicine Lodge - P28
17. Hutchinson - HUT
18. Wichita - ICT, AAO
19. Winfield - WLD
20. Coffeyville - CFV
21. Chanute - CNU
22. Parsons - PPF

KDHE Sites -

1. JFK Community Center
   Kansas City, KS.
2. Mine Creek Historic Area
   Linn County
3. Wichita-Sedgwick County Department of Community Health
   1900 East 9th St.
   Wichita, KS.
4. Peck Community Building
   Sumner County
5. Cedar Bluff Reservoir
   Trego County

pollution concentrations may continue to increase near the ground from numerous pollution sources since the air is not mixing within and above the inversion layer.

The other pollutant of concern mentioned earlier is particulate matter. Kansas has a long history of particulate matter problems caused by our weather. The Great Dust Bowl of the 1930's was caused, in part, by many months of minimal rainfall and high winds. This natural source of PM pollution, although not as bad as in the 1930's, is still a concern today as varying weather conditions across the state from year to year cause soil to be carried into the air and create health problems for citizens of Kansas.

Figure 2 - Dust storms 1930's and 2000.

The wind roses on page nine are examples of wind conditions experienced at four National Weather Service sites across the state in 2000. These four sites from different parts of the state show a representation of the wind speeds and directions for 2000. The wind speeds on the graphs are reported in knots (1 knot = 1.15 miles per hour). The predominant wind direction across the state of Kansas in 2000 was from the south. This follows in step with Kansas' historical meteorological wind data.

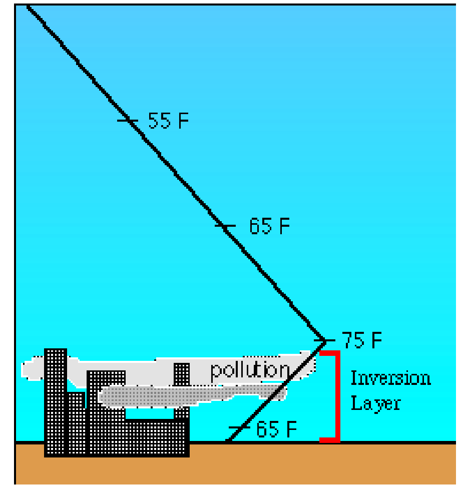
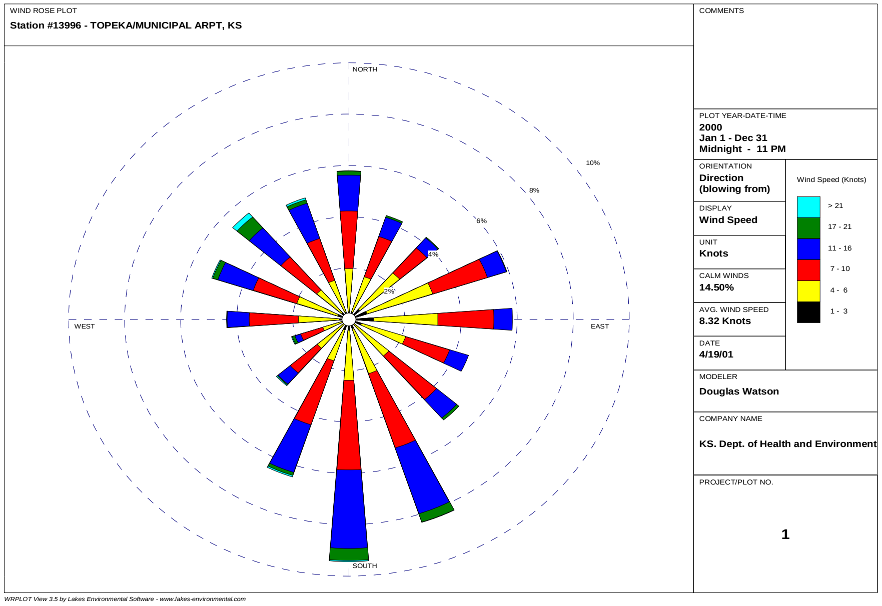
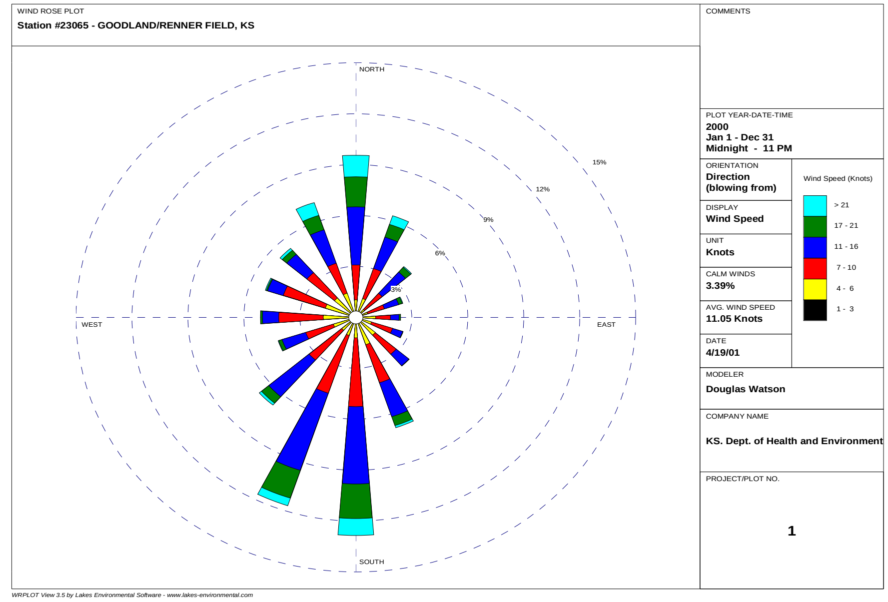


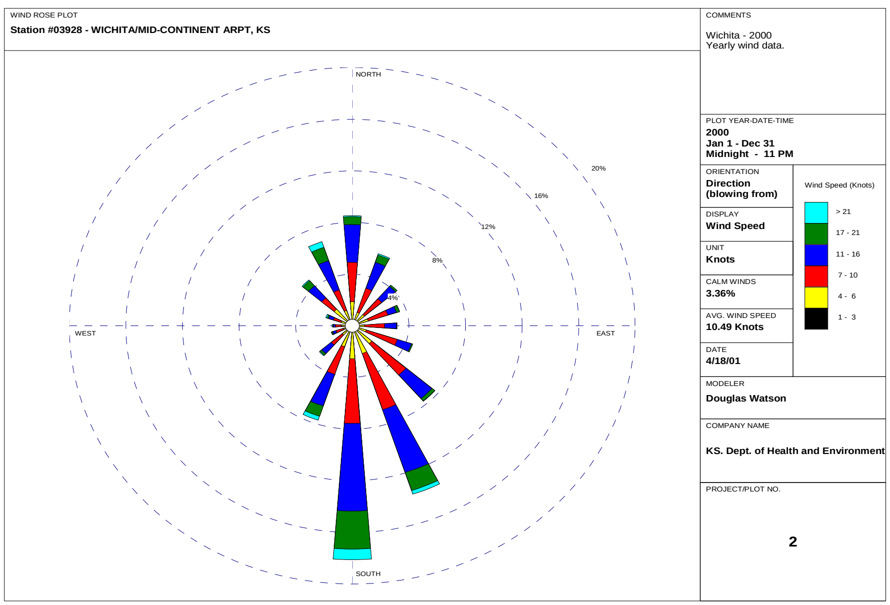
Figure 3 - Example of inversion layer.

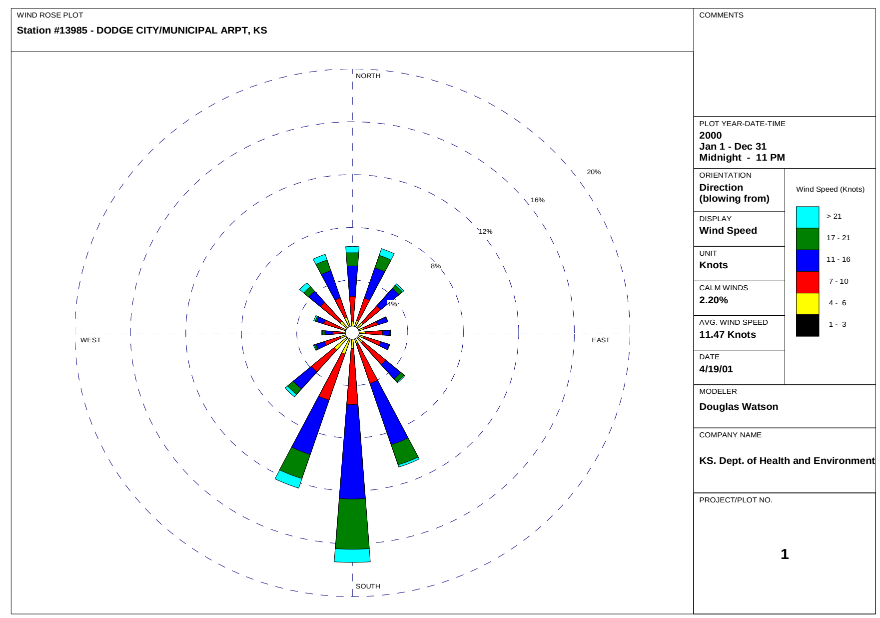
Another source of PM pollution that will be discussed in more detail later in this report is anthropogenic, generated by processes that have been initiated by humans. These particles may be emitted directly by a source or formed in the atmosphere by the transformation of gaseous precursor emissions such as sulfur dioxide (SO_2) and NO_x. Meteorological conditions also affect how these man-made sources of PM form and disperse. One factor that is common in Kansas that can lead to high pollution episodes is a surface inversion. Like upper air inversions, warmer air just above the surface of the earth forms a surface inversion and caps all pollutants below it. These inversions are mainly caused by the faster loss of heat from the surface than the air directly above it. In Kansas, surface inversions are more common in the winter months, but can occur during any season and lead to pollution problems. Figure 3 shows a simplified version of how a surface inversion would appear in a temperature profile of the atmosphere. The figure shows how the warm air aloft can trap the pollution at the surface.

Temperatures in Kansas have ranged from 121^0 F in Fredonia & Alton (1936) to minus 40^0 F in Lebanon (1905).









On the average, Kansas experiences 226 sunny days per year.